



# Airborne Aerosol Optical Depth, Water Vapor, and Ozone Measurements and Analyses in Support of the 2001 Intensive Field Campaign of CLAMS

A summary for the CLAMS Planning Meeting

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# AATS-14 (14-channel Ames Airborne Tracking Sunphotometer) aboard the UW CV-580

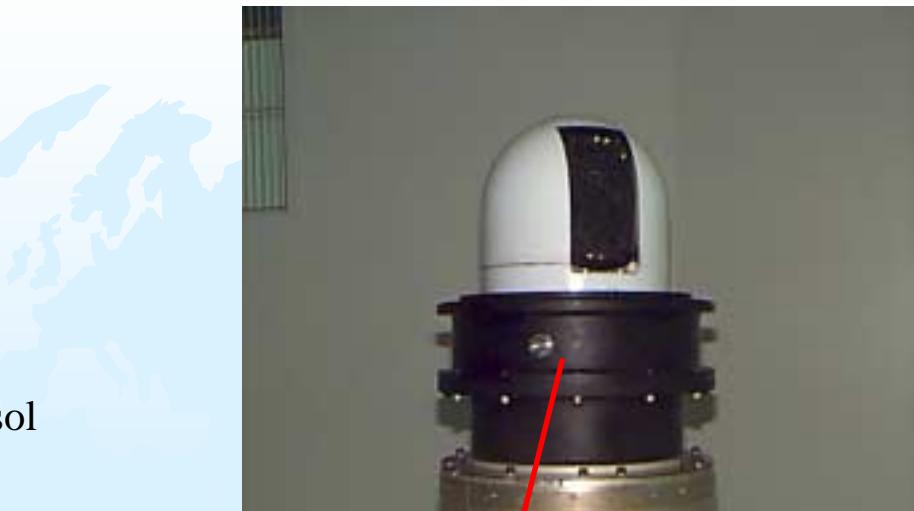


## Research Areas:

1. Airborne Measurements of
  - aerosol optical depth
  - water vapor column content
  - ozone column content
2. Satellite Validation
3. Observationally-based estimates of aerosol radiative forcing of climate

Example of results **on the web**:

<http://geo.arc.nasa.gov/sgg/PRIDE>

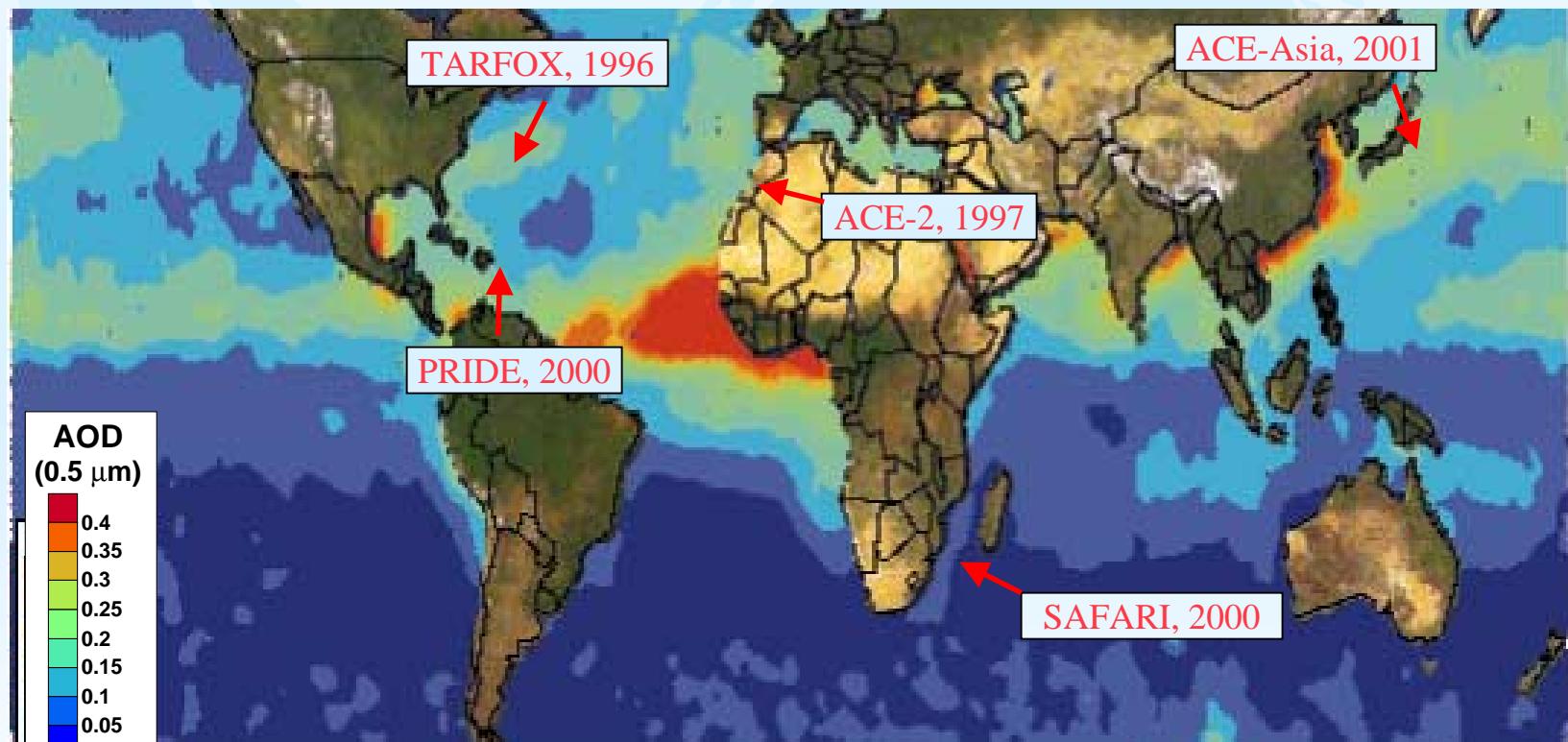




## Major aerosol field campaigns: Past, present and future

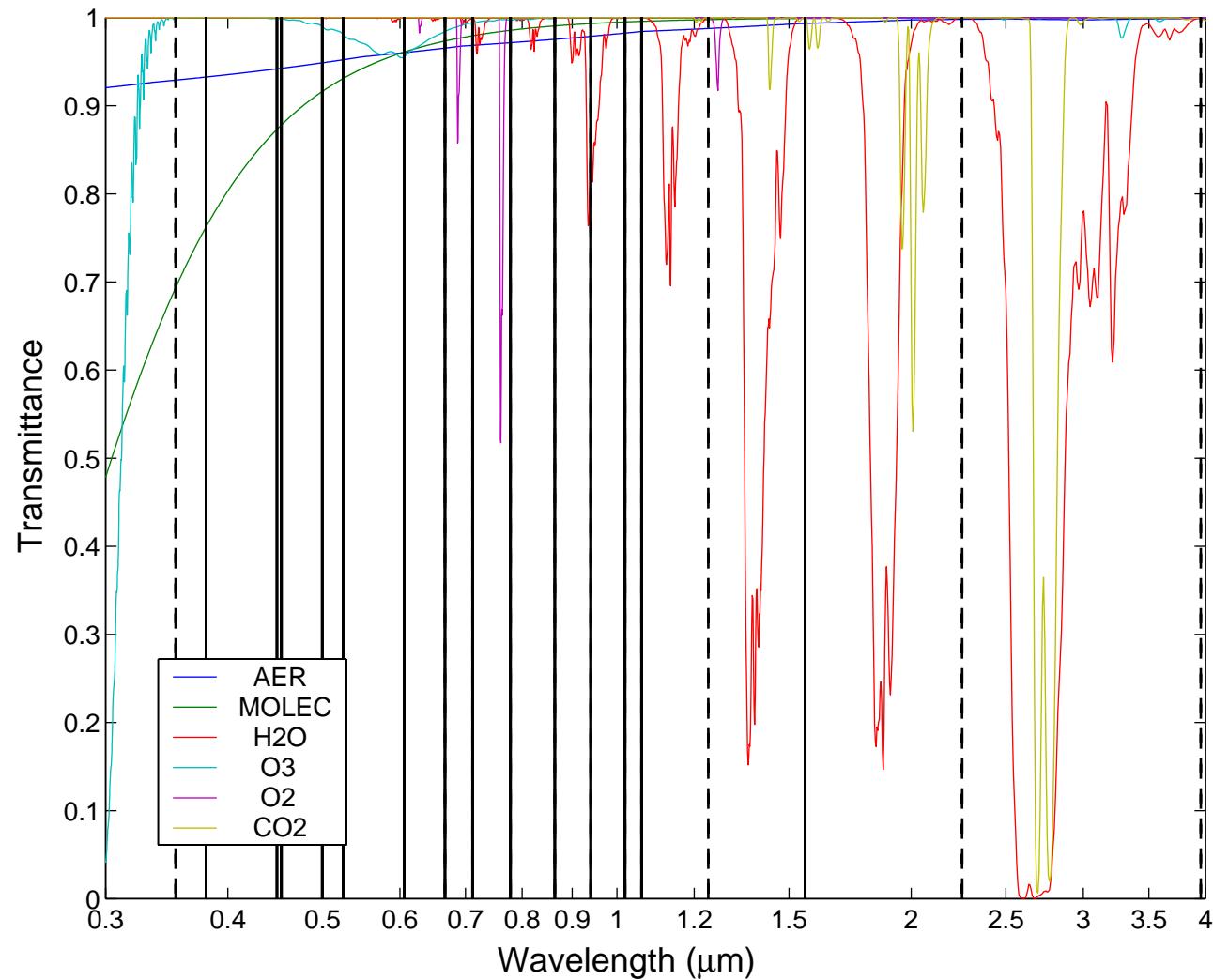
Aerosol Optical Depth Derived from Upward Scattered Solar Radiance

AVHRR/NOAA 11, March - May, Husar et al., *J. Geophys. Res.*, 102, 16,889, 1997.



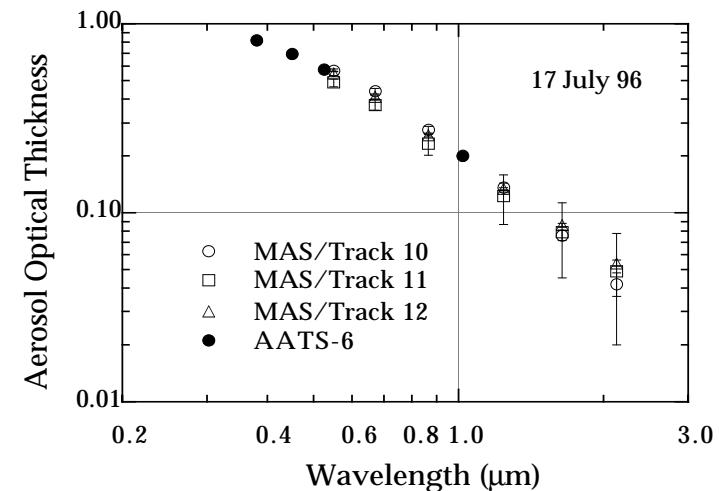


# AATS-14 channels and atmospheric transmittance





# Satellite Validations using AATS-6 and -14

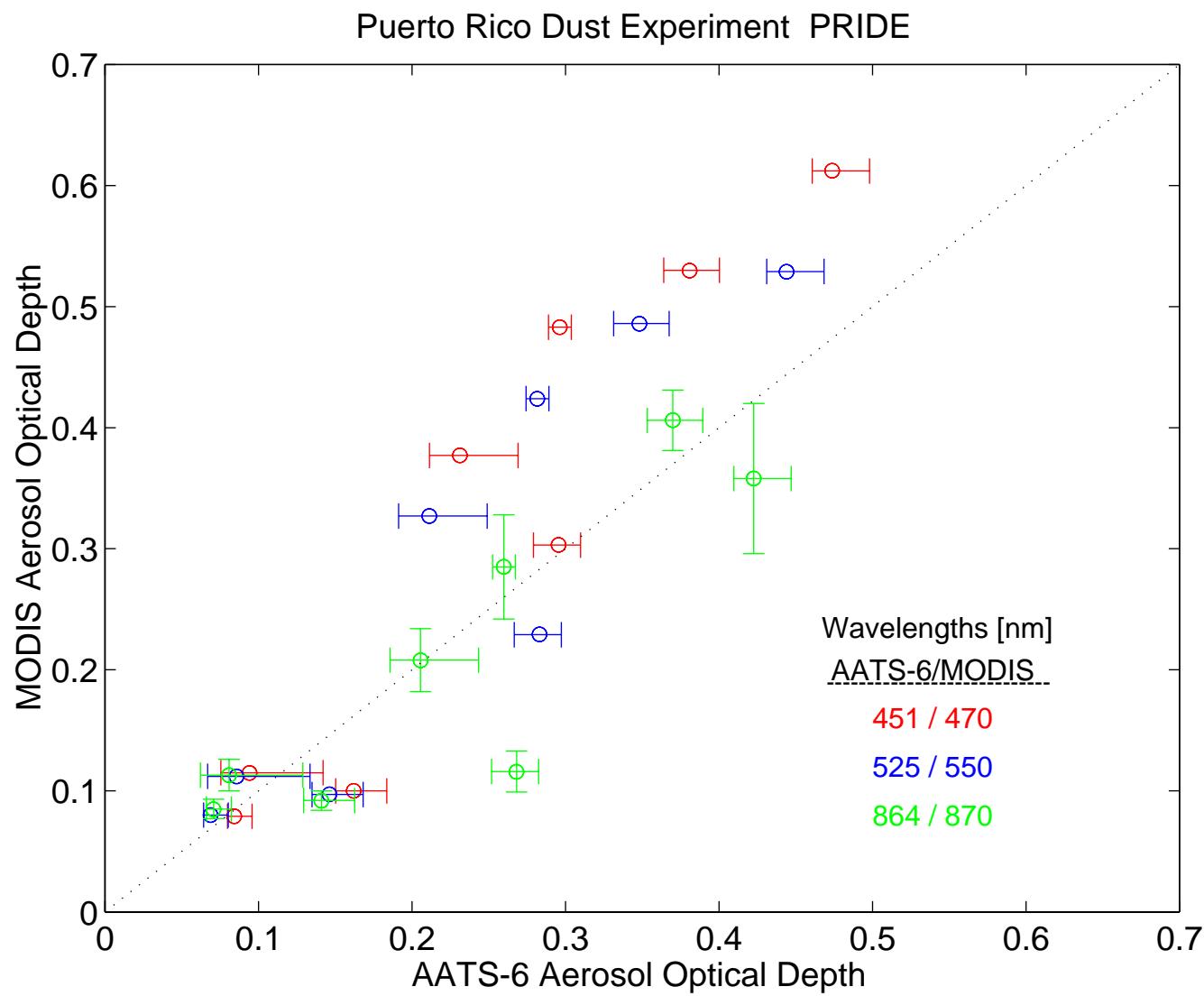


↑ **Aerosol optical thickness** measured by (AATS-6) aboard the C-131A aircraft and derived from MAS data. (Tanre et al., 1999)

← **Latitude transects of aerosol optical depth** and Ångström wavelength exponent as derived from the AATS-6 aboard the UW C-131A, the ATSR-2, and the AVHRR. (Veefkind et al., 1999)



# AOD intercomparison: MODIS vs. AATS in PRIDE





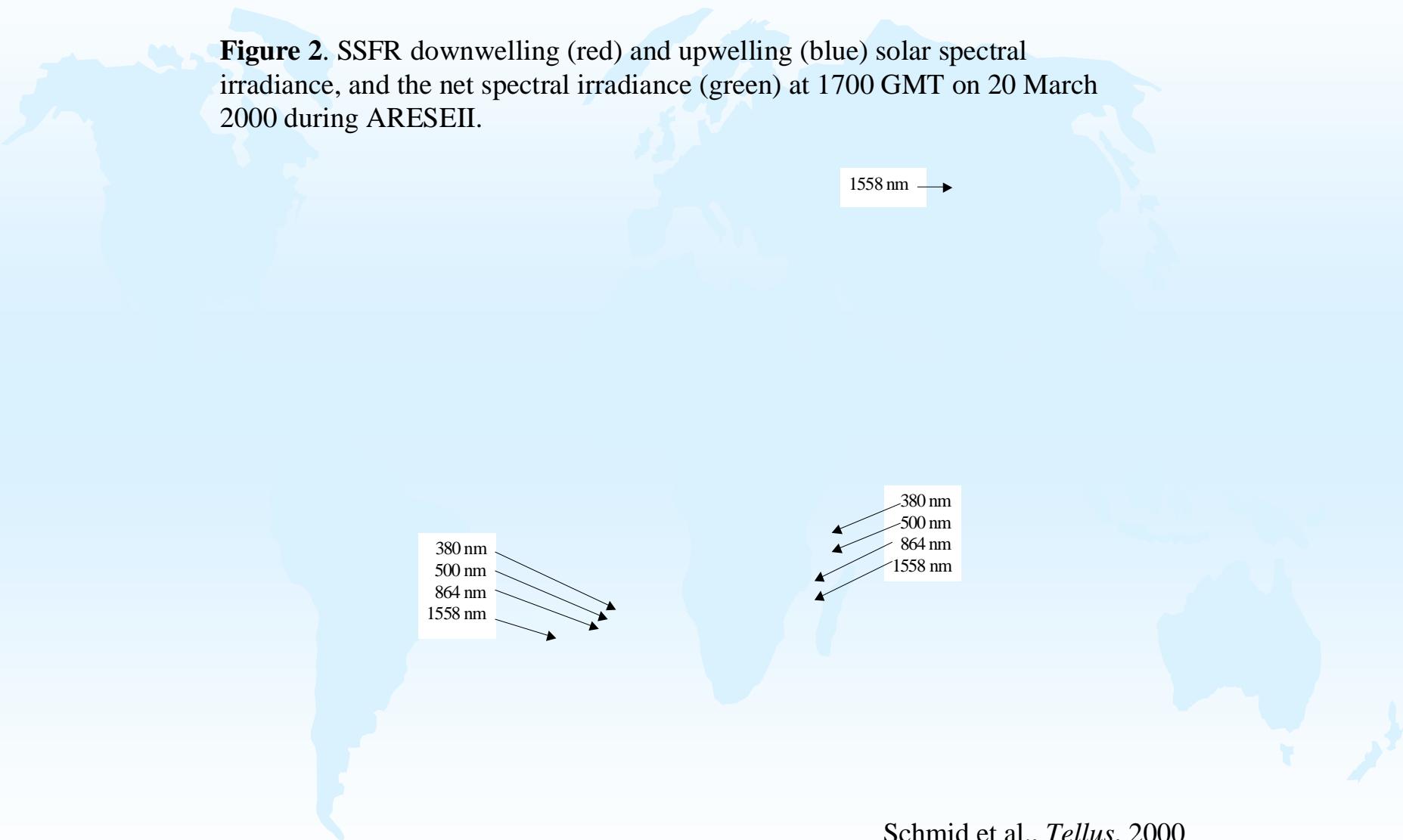
# Summary

- ☎ The Ames Satellite/Sunphotometer group is actively involved in **EOS sensor data validation** and the research on **aerosol-climate interactions**.
- ☎ Research contributions include, but are not limited to:
  - 1) Aircraft-based **measurements of aerosol optical depth, ozone and water vapor**
  - 2) **Satellite Validation** thereby
  - 3) Studies of **aerosol radiative forcing** of climate
- ☎ Ongoing and future **field campaigns**:
  - ☎ PRIDE (Puerto Rico Dust Experiment)
  - ☎ SAFARI 2000 (Southern African Fire-Atmosphere Regional Science Initiative)
  - ☎ ACE-Asia (Asian Pacific Regional Aerosol Characterization Experiment)
- ☎ Estimated **Costs for AATS-14** participation in CLAMS: **~\$41K**
  - ☎ (Excluding integrated data analyses)



## Vertical structure of aerosol extinction in ACE-2

**Figure 2.** SSFR downwelling (red) and upwelling (blue) solar spectral irradiance, and the net spectral irradiance (green) at 1700 GMT on 20 March 2000 during ARESEII.



Schmid et al., *Tellus*, 2000



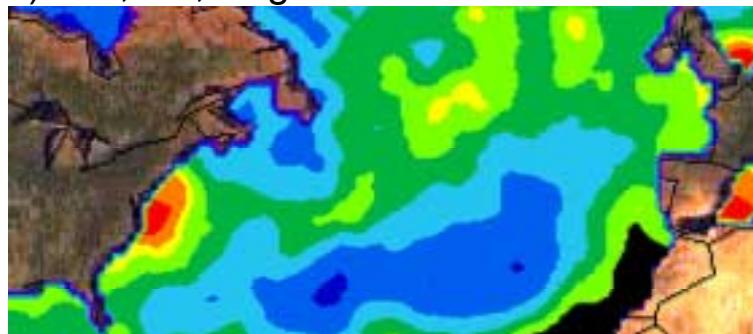
# Flux change / Radiative Forcing Studies

Annual average ( $\omega=0.9$ ) =  $-3.5 \text{ W m}^{-2}$

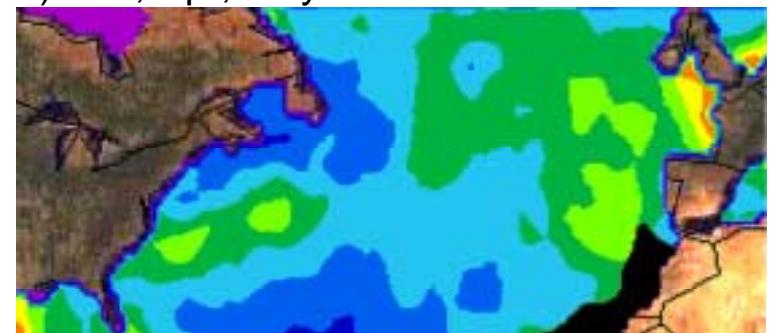
a) Dec, Jan, Feb



c) Jun, Jul, Aug



b) Mar, Apr, May



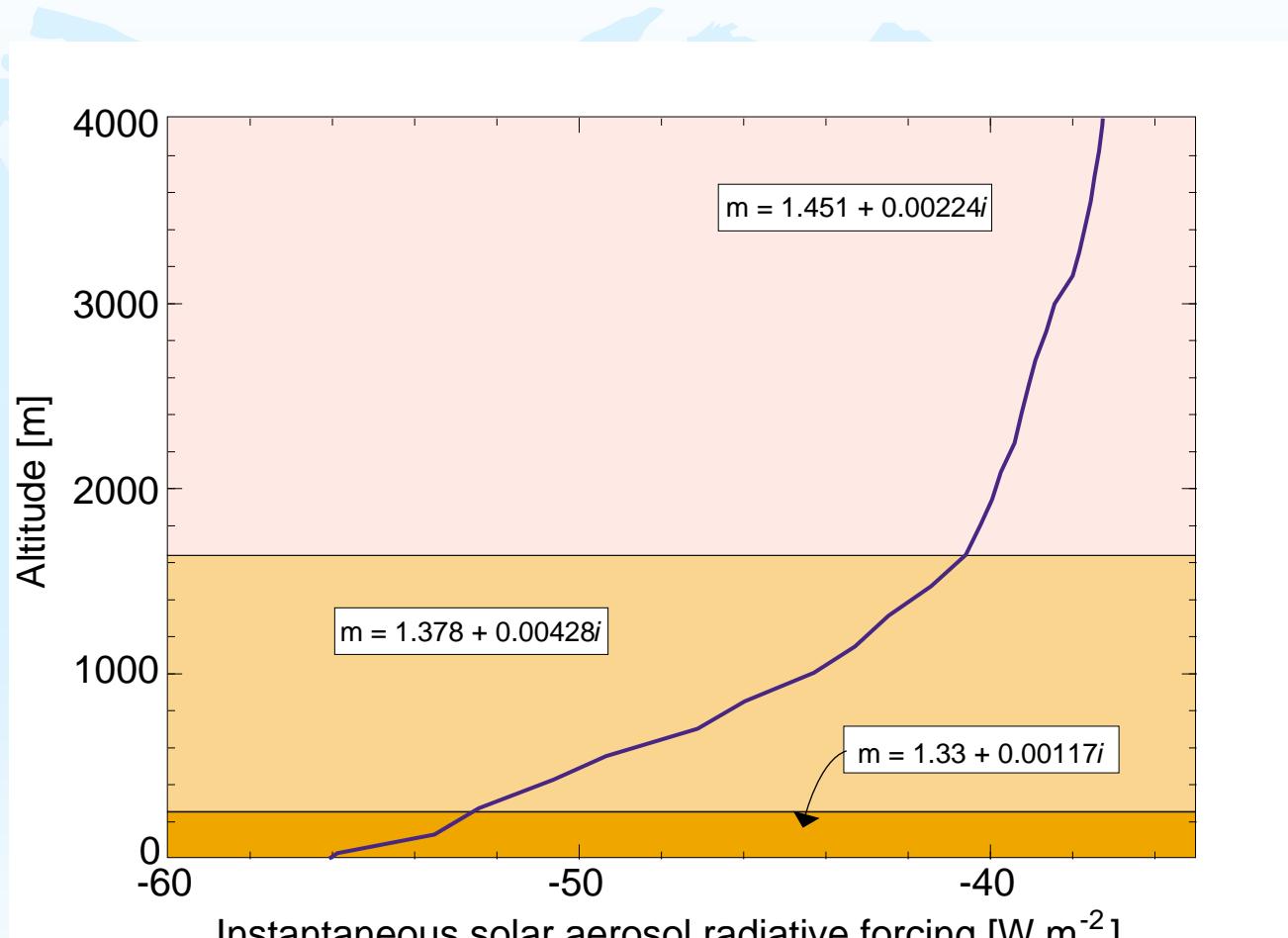
d) Sep, Oct, Nov



Bergstrom, R. W., and P. B. Russell, *Geophys. Res. Lett.*, 26, 1731-1734, 1999.



# Vertical structure of aerosol radiative forcing in TARFOX



Redemann et al., *JGR*, 2000b



# Task 1: Sunphotometer cloud screening and re-archival

